NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

APPLIED PHYSICS DEPARTMENT

MAPH 5134 – GLOBAL TECTONICS

MSc PART 1: DECEMBER 2004 DURATION: 4 HOURS

ANSWER **ALL** QUESTIONS.

NOTE: You are encouraged to make use of sketches to further illustrate your answers where possible.

1. (a) Describe three kinds of earthquake waves in terms of the motions and speeds they have. [3]

(b) Give Wegener's evidence for continental drift. Why was his hypothesis not generally accepted until decades after his death? [5]

(c) Explain the presence of oil and coal deposits in the cold northern hemisphere relating their presence to continental drift [4]

(d) Define the following terms and indicate their relevance to the development of plate tectonics.

a. Oceanic heat flow

b. Sea floor spreading

c. Curie temperature

d. Ocean bathymetry [8]

(e) What are, where and how do ophiolites form? [3]

(f) Explain the isostatic rebound theory [4]

(g) The elevation of the abyssal ocean floor decreases, relatively smoothly, with distance away from a mid-ocean ridge spreading center. Why is this? How would the sea floor level respond if the rate of spreading were to increase? [4]

(h) Briefly explain the phenomenon known as True Polar Wander (TPW) showing how it differs from Apparent Polar Wander (APW). [5]

(i) Give two (2) examples of <u>active</u> continental rifts and list four (4) of their characteristics [4]

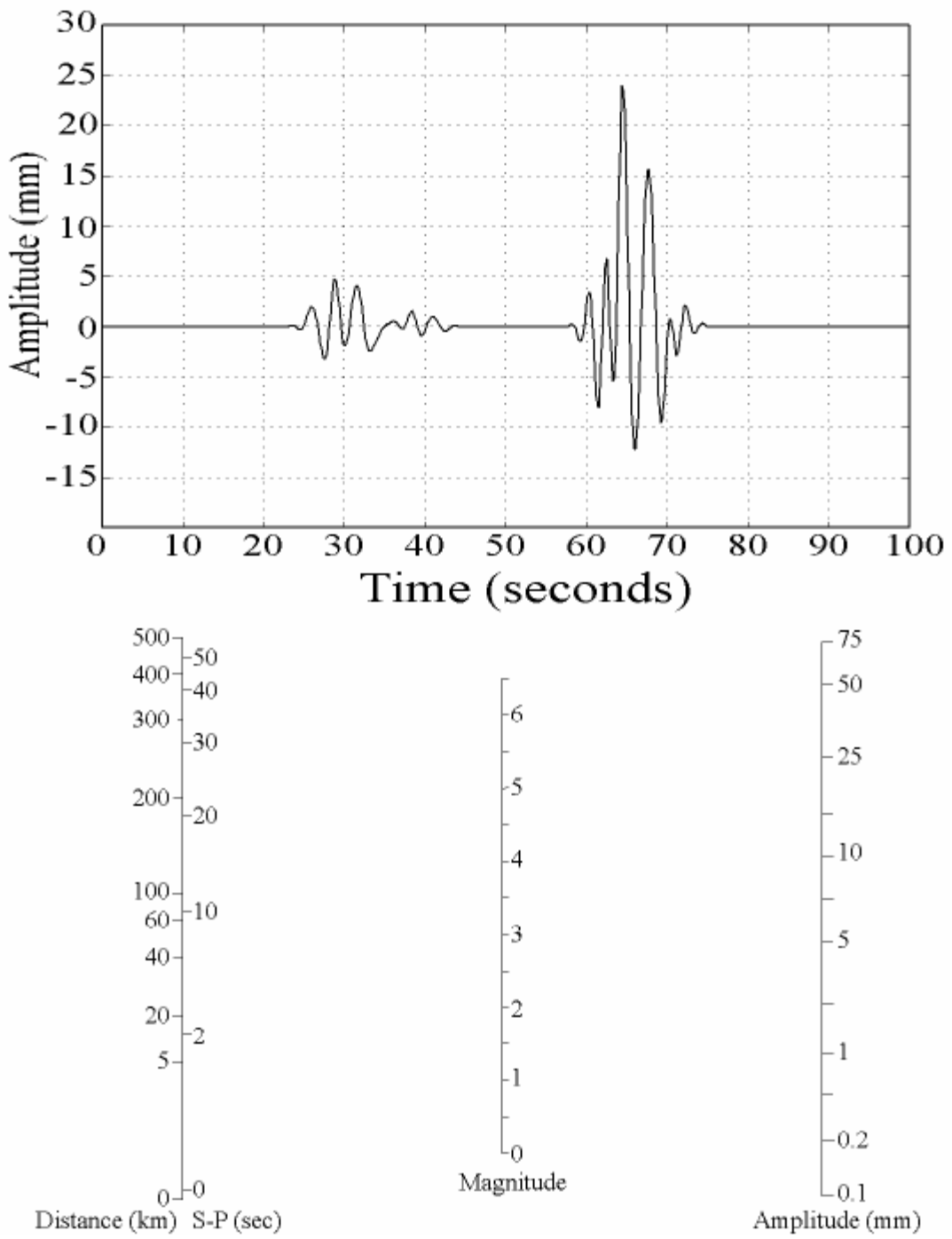
2. Take a look at the seismogram and magnitude calculation scale below. Answer the following question related to them:

a. Approximately how far away did this earthquake occur? [3]

b. What is the local magnitude of the earthquake? [6]

c. How many similar seismograms would you need to determine where the focus of the earthquake was? Why? [6]

d. Other than the location and magnitude of a quake, multiple seismograms can also give one other important piece of information about the rupture of a fault. What is that piece of information and what part of the seismogram would one read to get a handle on it? [5]



3. Explain what causes the Earth's crustal plates to move, sometimes colliding and sometimes moving apart. Draw a cross-section of the Earth to illustrate your answer. [20]

4. Write an illustrated essay on the development of island arcs and associated basins. [20]

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